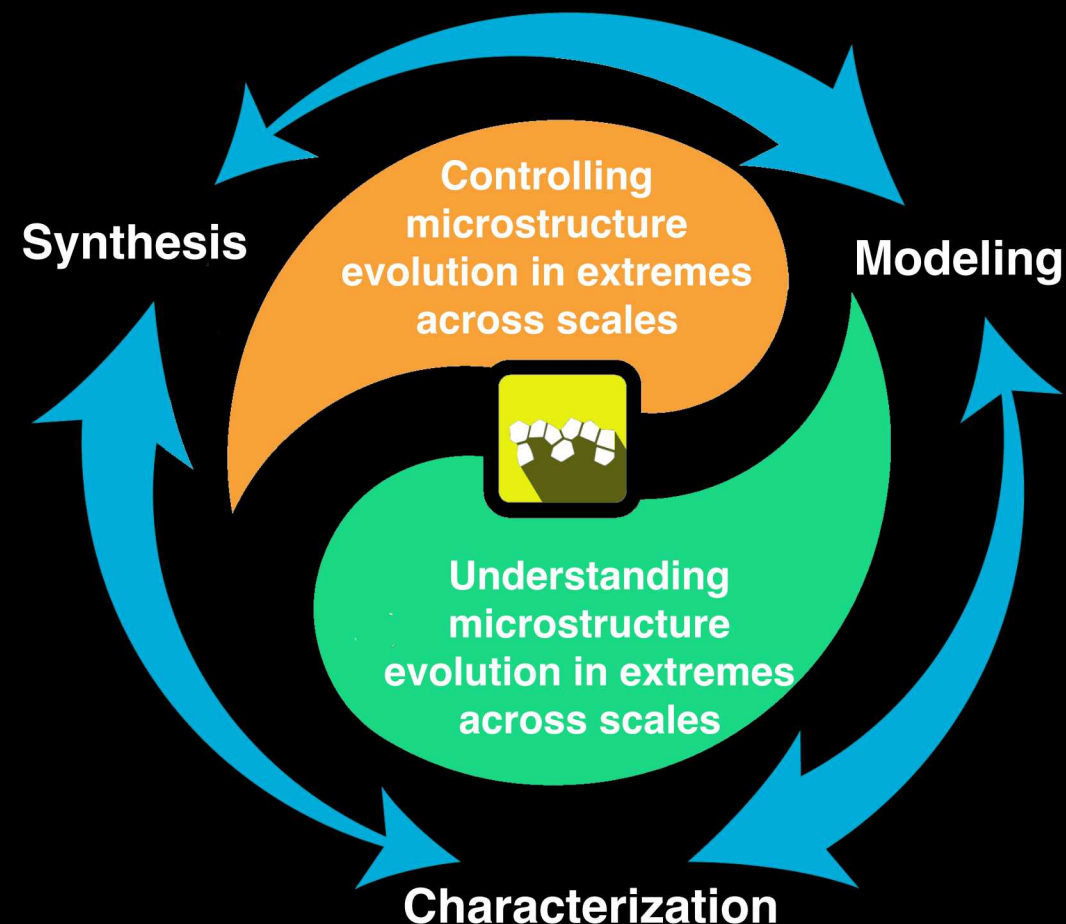




Exceptional service in the national interest

2ND WORKSHOP ON: ENGINEERING RESEARCH CENTER FOR ADVANCED MATERIALS MANUFACTURING AND DISCOVERY FOR EXTREMES (CAM²DE²)



“CHALLENGES AND OPPORTUNITIES FOR MATERIALS DISCOVERY IN EXTREME ENVIRONMENTS”

REMI DINGREVILLE, SANDIA NATIONAL LABORATORIES

SAND2019-2993 C

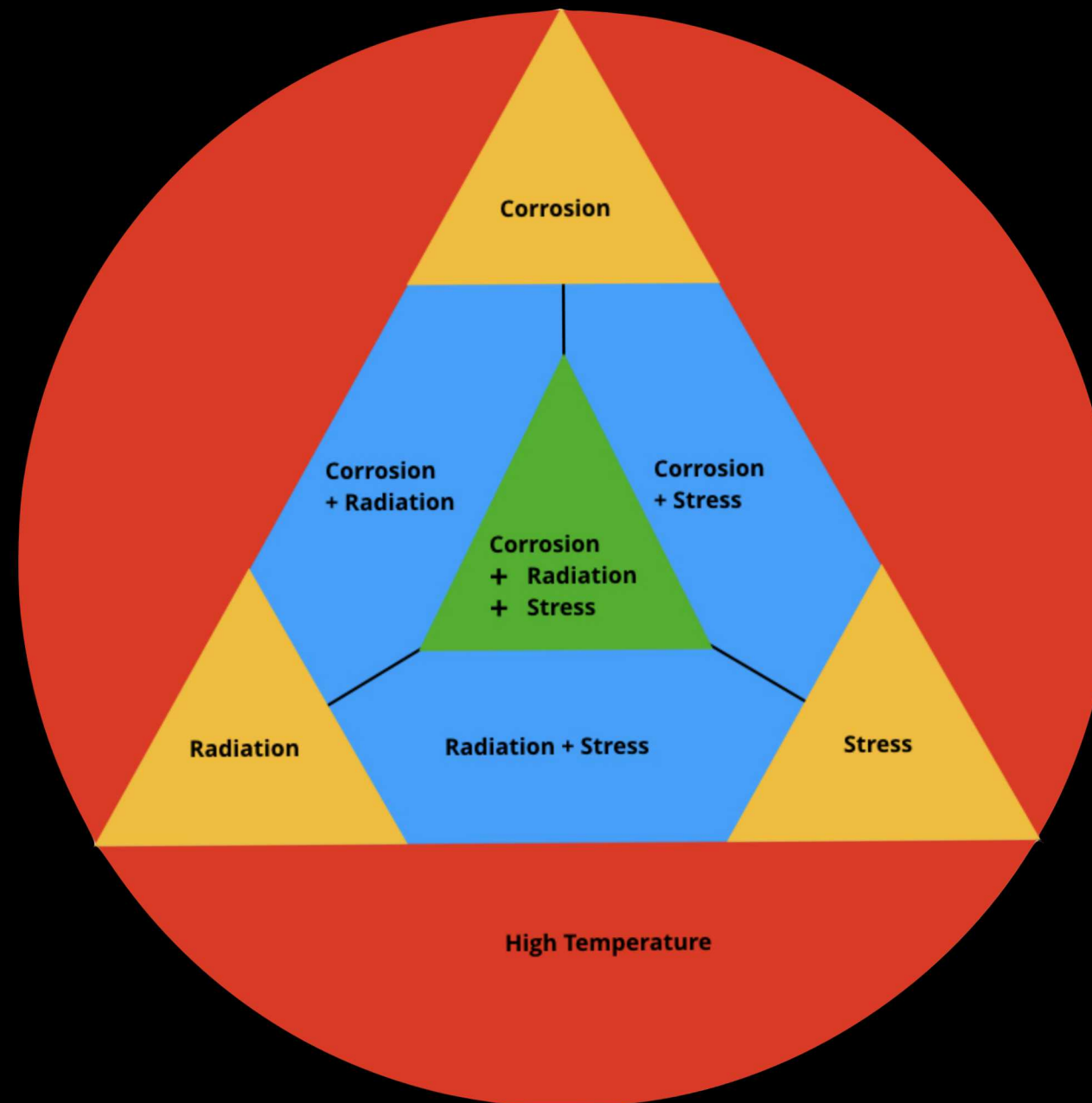


U.S. DEPARTMENT OF
ENERGY

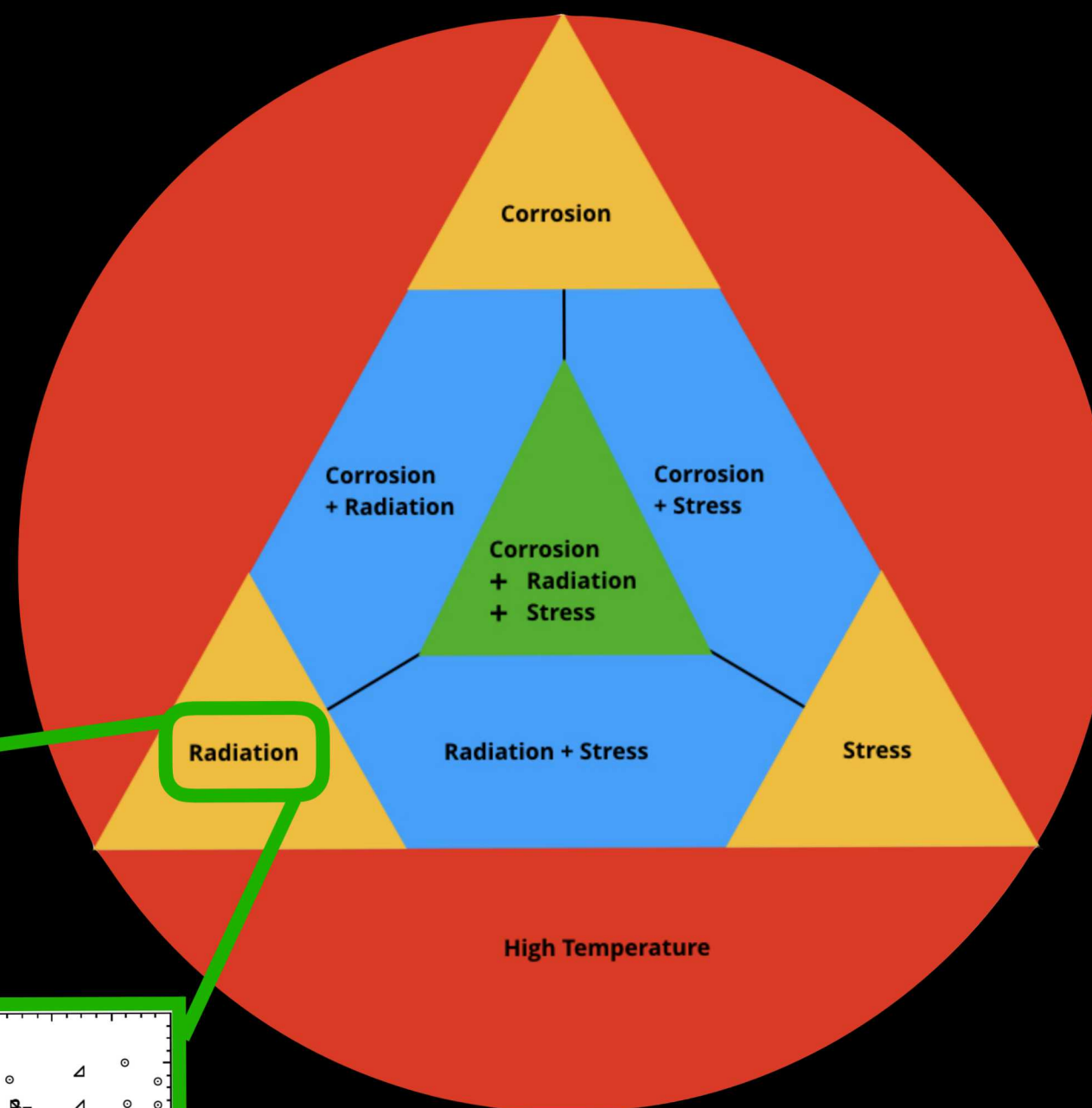


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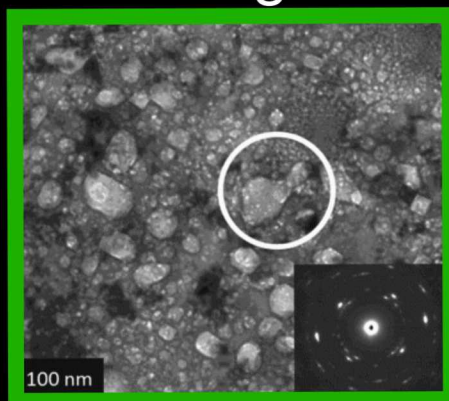
DEFINITION OF EXTREME ENVIRONMENTS



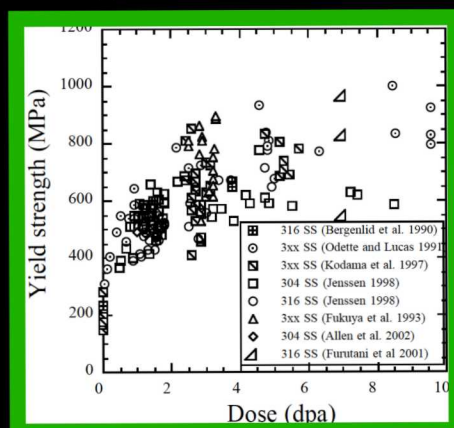
DEFINITION OF EXTREME ENVIRONMENTS



Void swelling

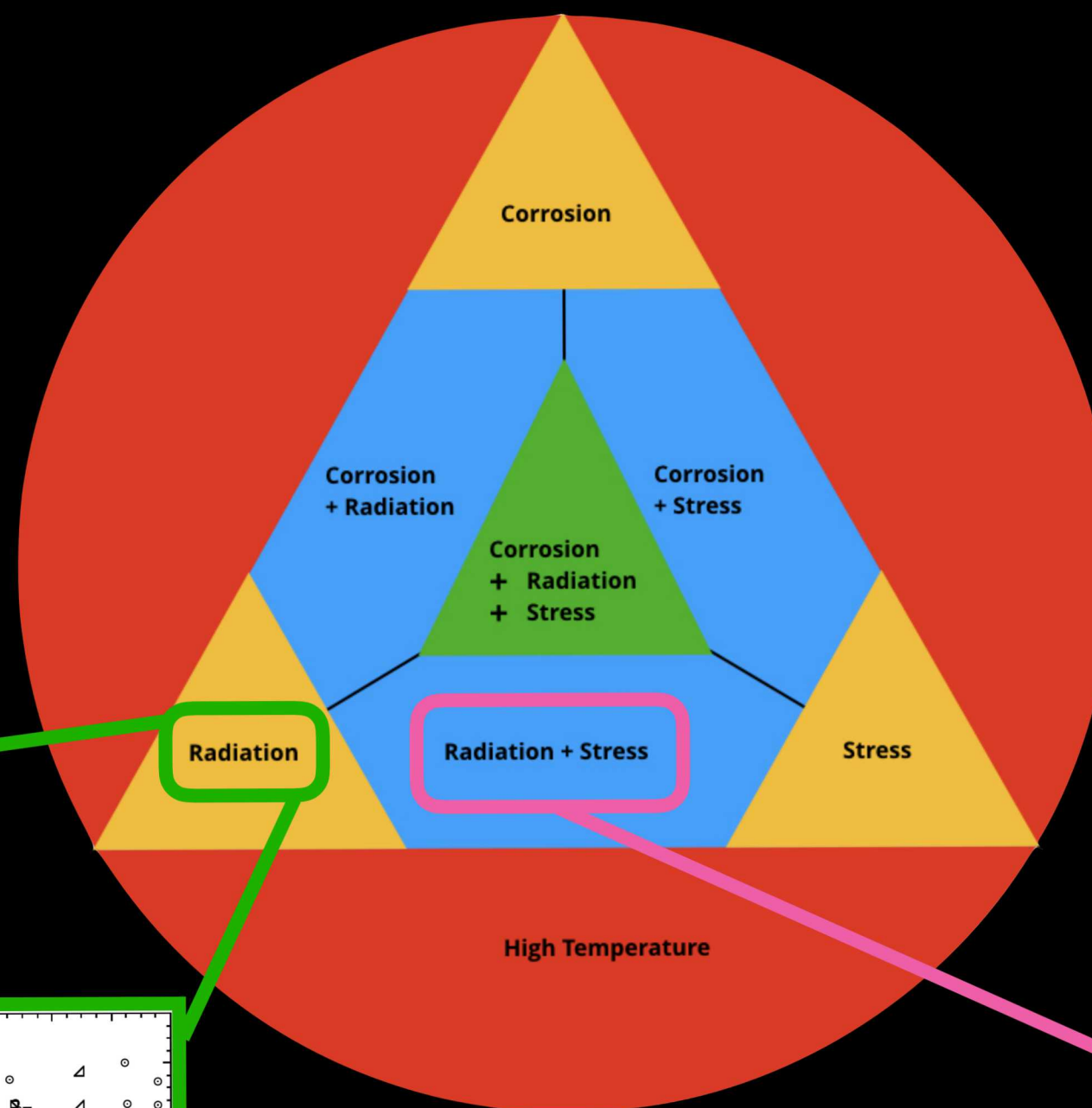


[Muntifering et al., MRL (2016)]

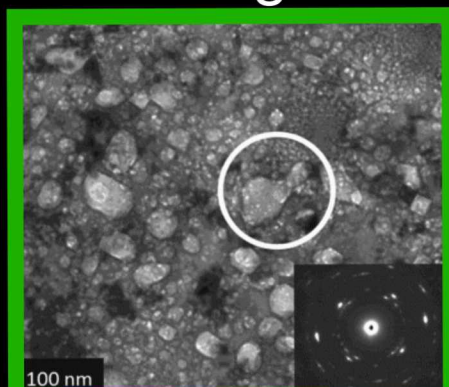


Hardening
[Busby et al.]

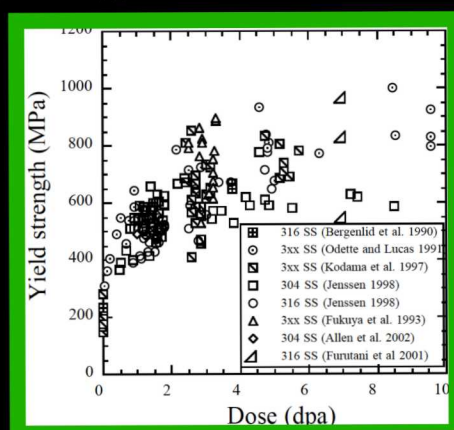
DEFINITION OF EXTREME ENVIRONMENTS



Void swelling

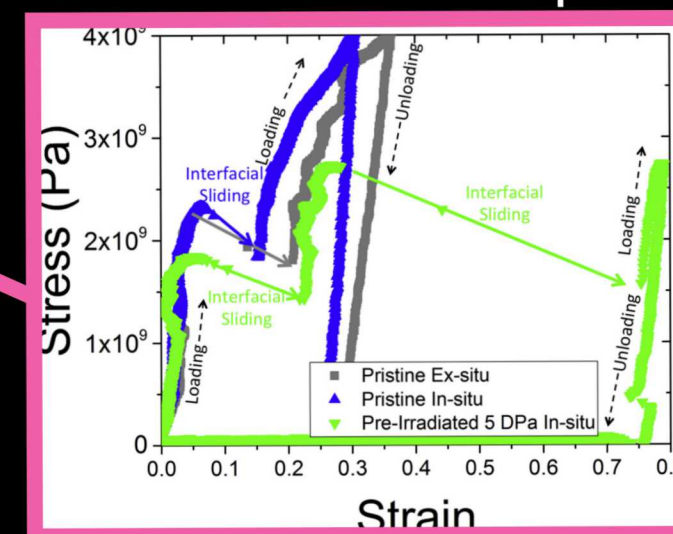


[Muntifering et al., MRL (2016)]



Hardening
[Busby et al.]

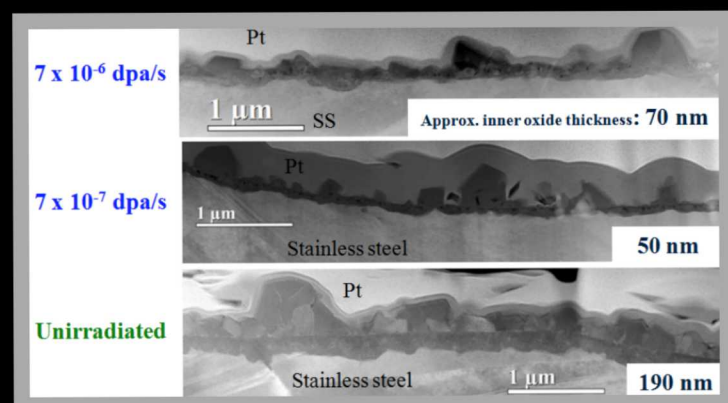
Irradiation creep



[Dillon et al., JNM (2016)]

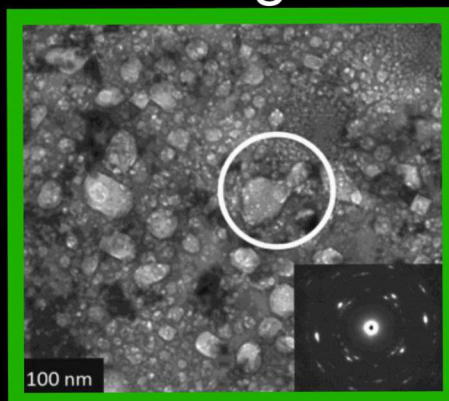
DEFINITION OF EXTREME ENVIRONMENTS

Irradiation-assisted corrosion

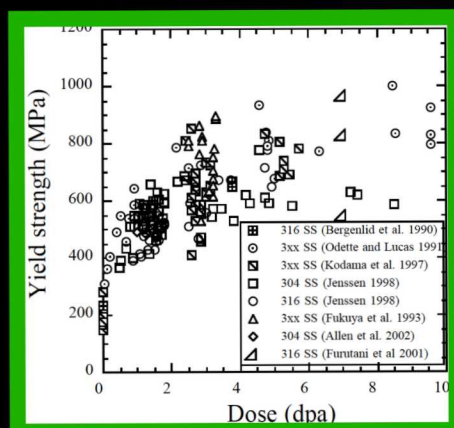


[Jiao and Was, DE-AC07-05ID14517 (2015)]

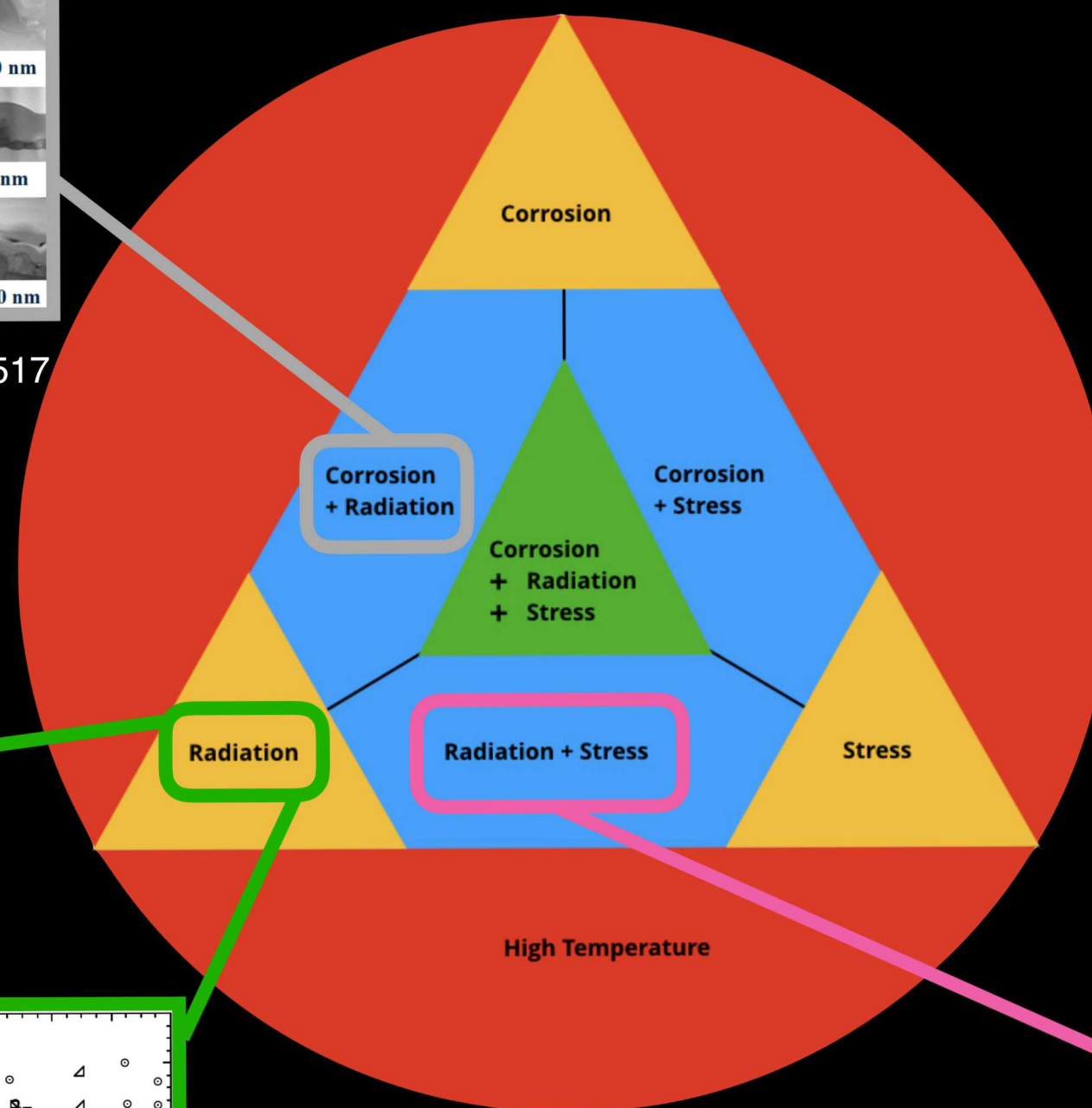
Void swelling



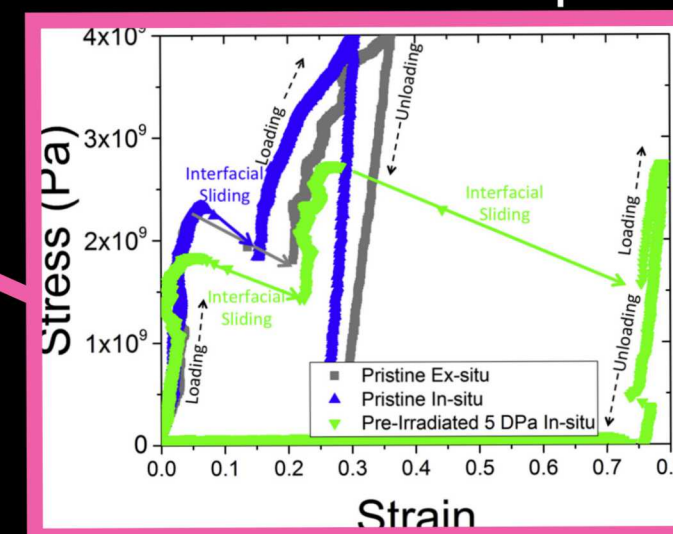
[Muntifering et al., MRL (2016)]



Hardening
[Busby et al.]



Irradiation creep

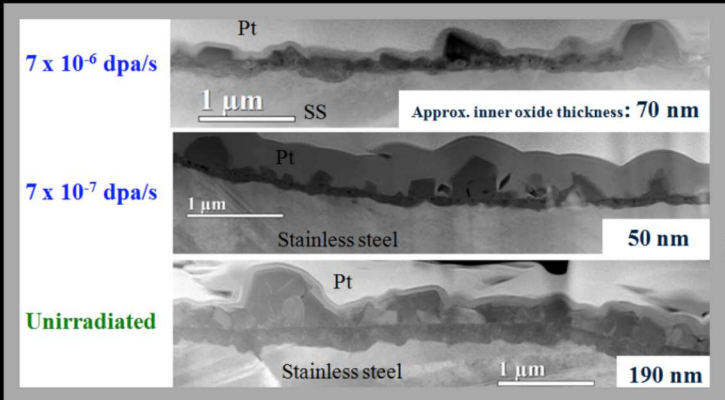


[Dillon et al., JNM (2016)]

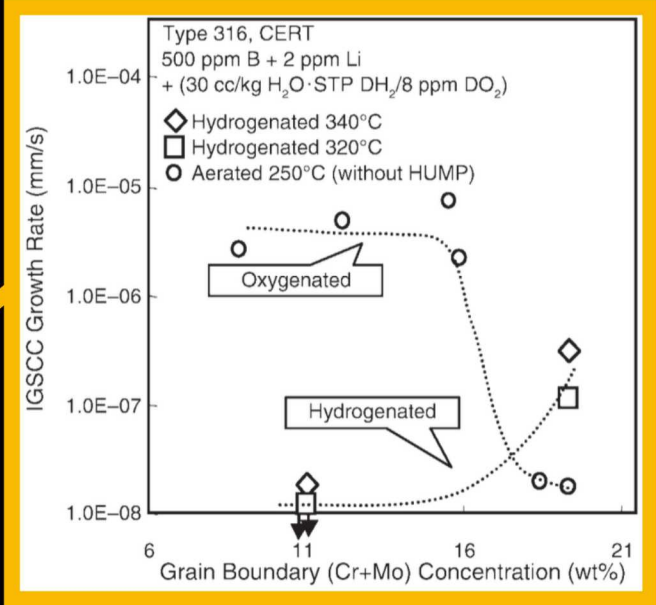
DEFINITION OF EXTREME ENVIRONMENTS

Stress Corrosion Cracking

Irradiation-assisted corrosion

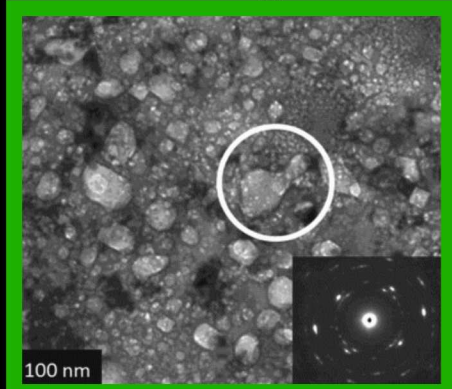


[Jiao and Was, DE-AC07-05ID14517 (2015)]

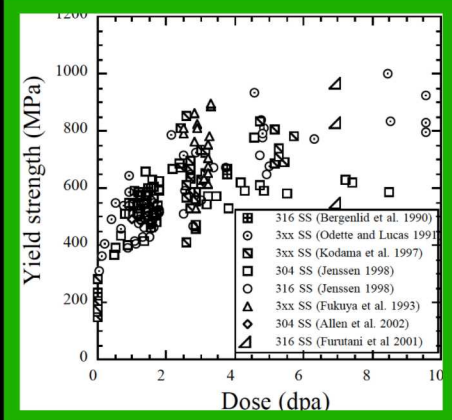


[Arioka et al., Corrosion (2006)]

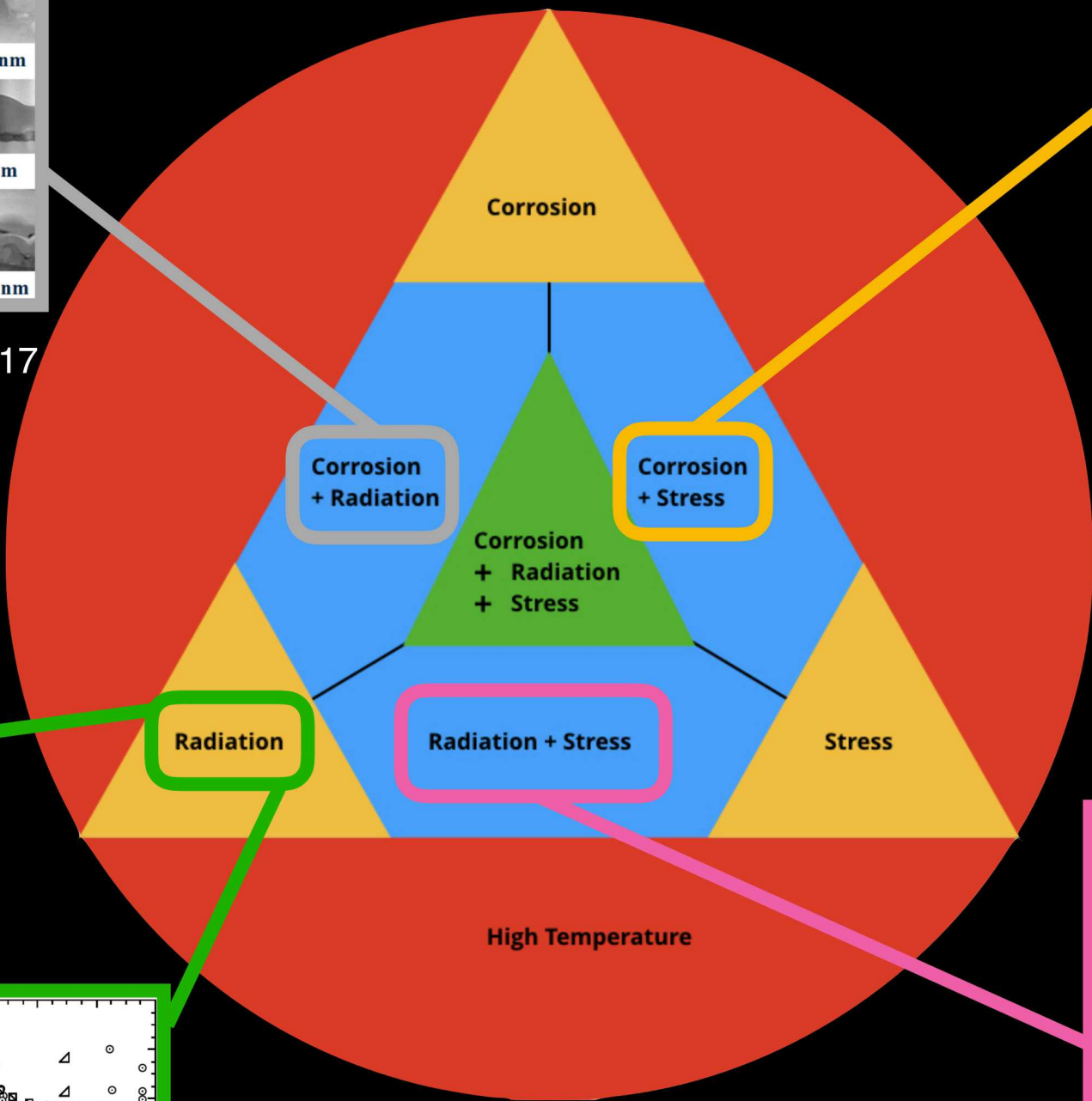
Void swelling



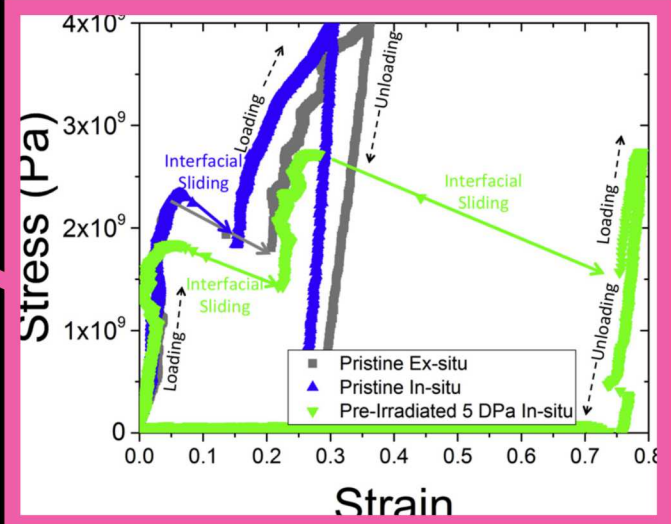
[Muntifering et al., MRL (2016)]



Hardening
[Busby et al.]

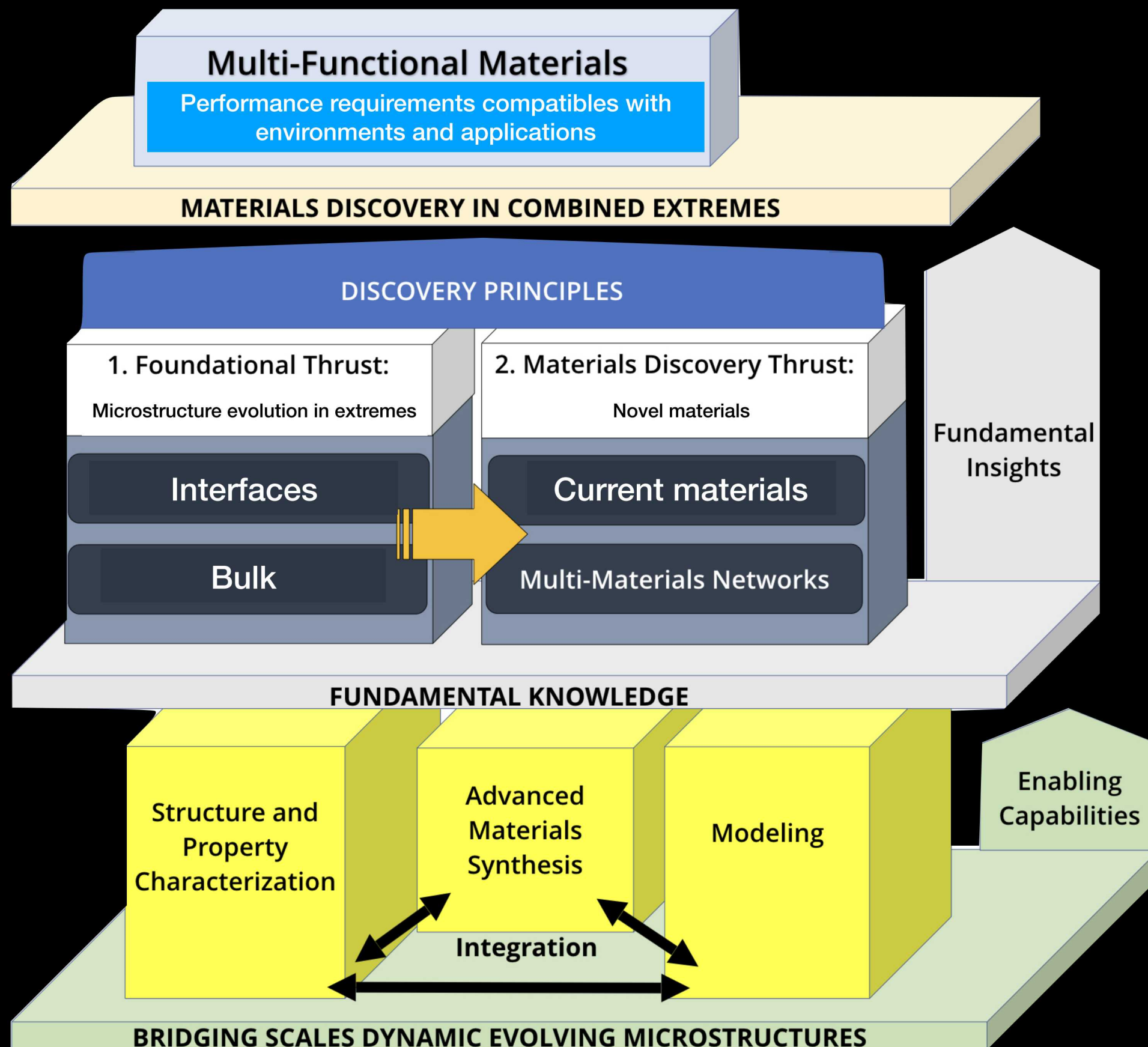


Irradiation creep



[Dillon et al., JNM (2016)]

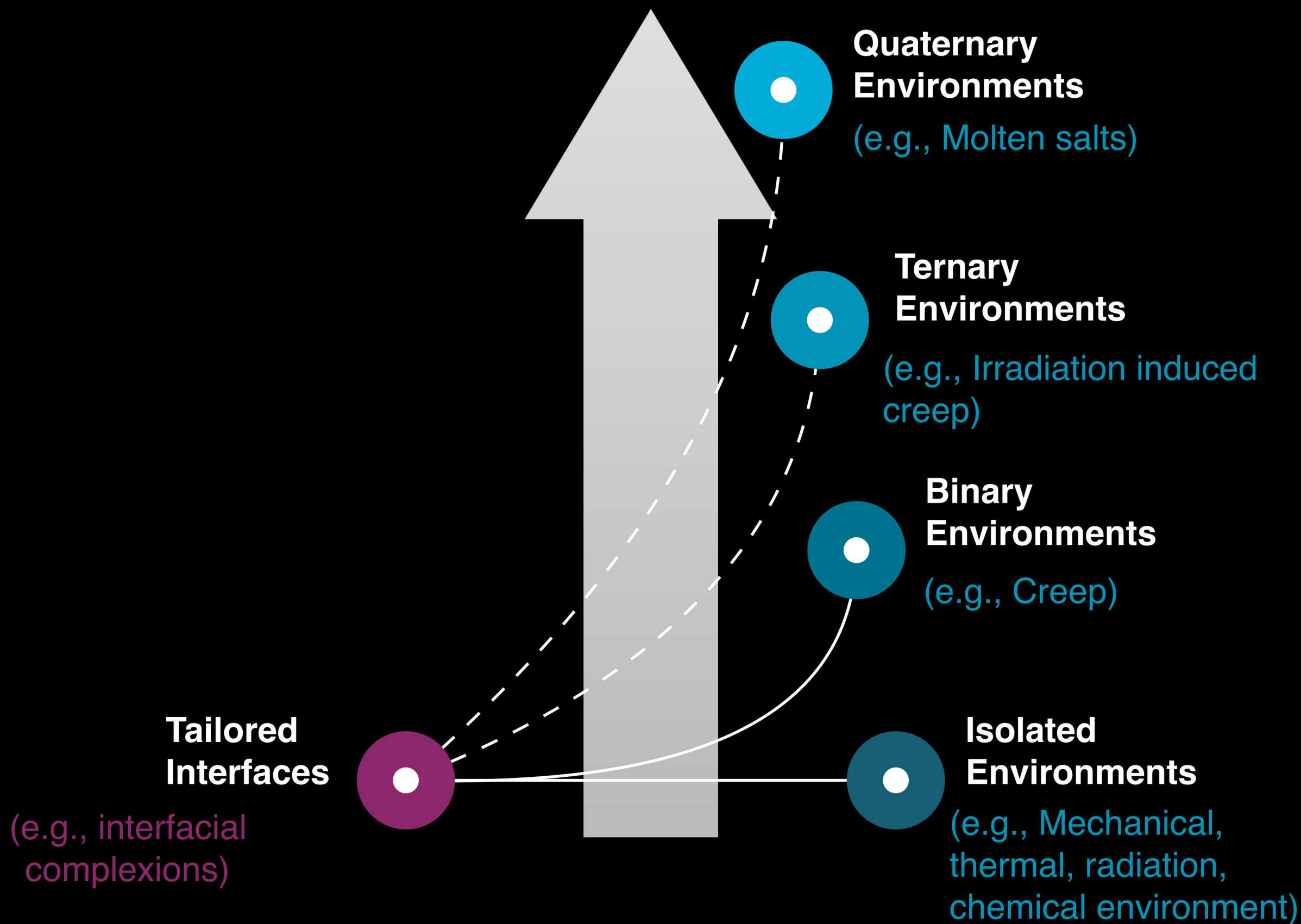
HOW DO WE GO ABOUT IT TODAY?





MICROSTRUCTURAL COMPLEXITY

ENVIRONMENTAL COMPLEXITY



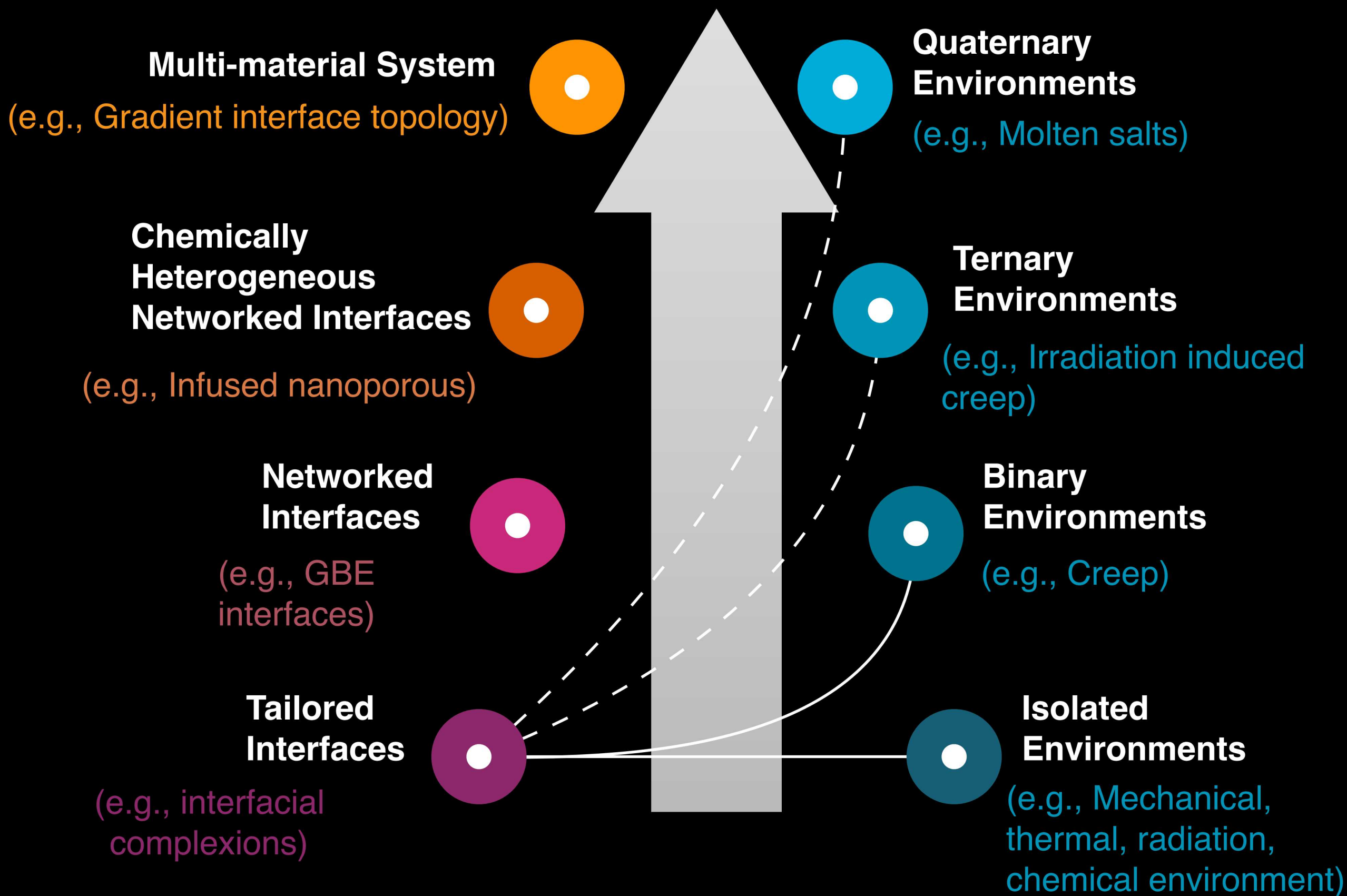
CHALLENGES AND OPPORTUNITIES: MATERIALS NEEDS



Sandia
National
Laboratories

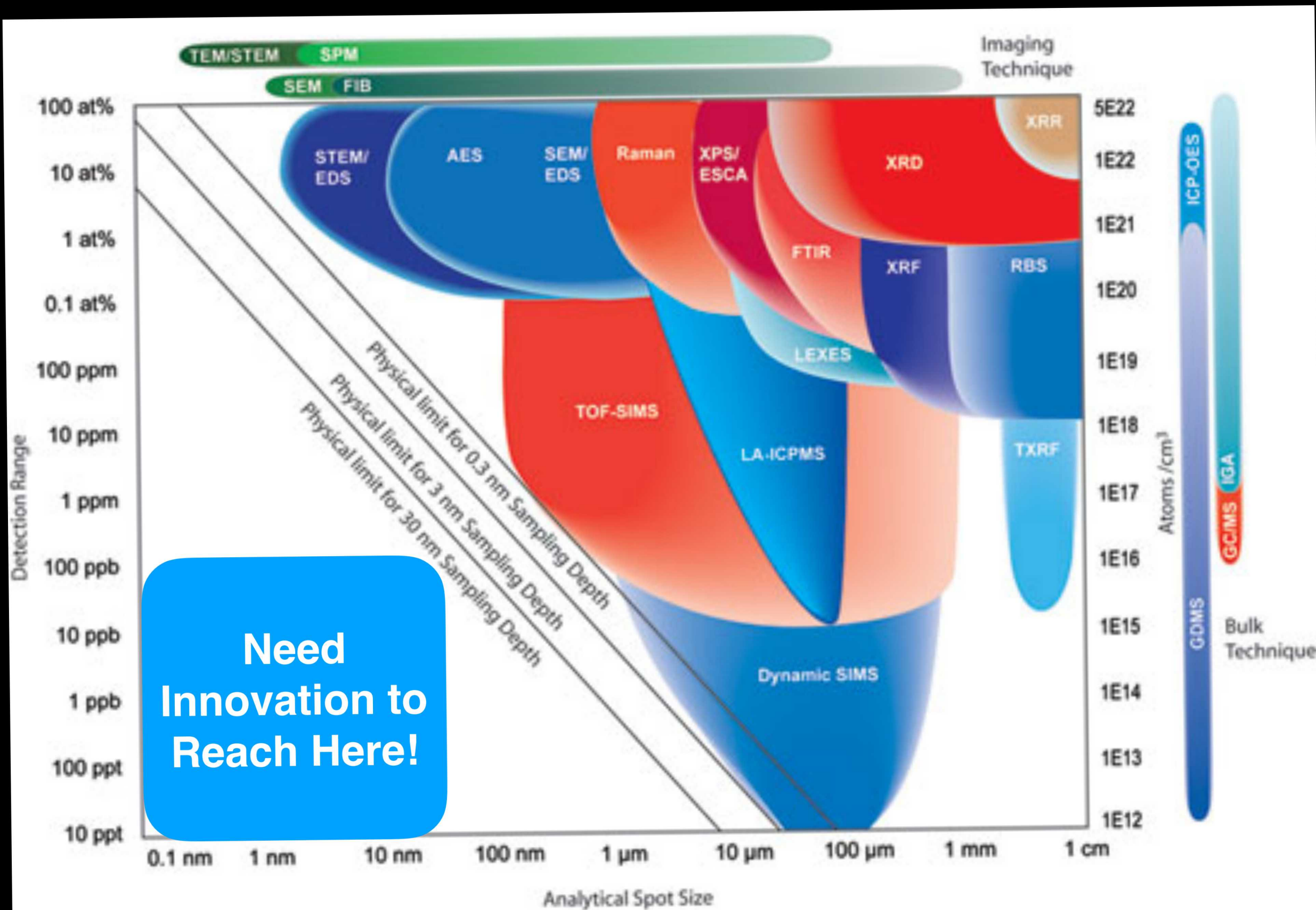
MICROSTRUCTURAL COMPLEXITY

ENVIRONMENTAL COMPLEXITY



KEY OPPORTUNITIES?

MICROSTRUCTURE CHARACTERIZATION



[EAG Laboratories]

CULTURAL TREND IN MATERIALS DISCOVERY



Sandia
National
Laboratories

<https://ceimm.jhu.edu>



<https://hemi.jhu.edu/cmede/>



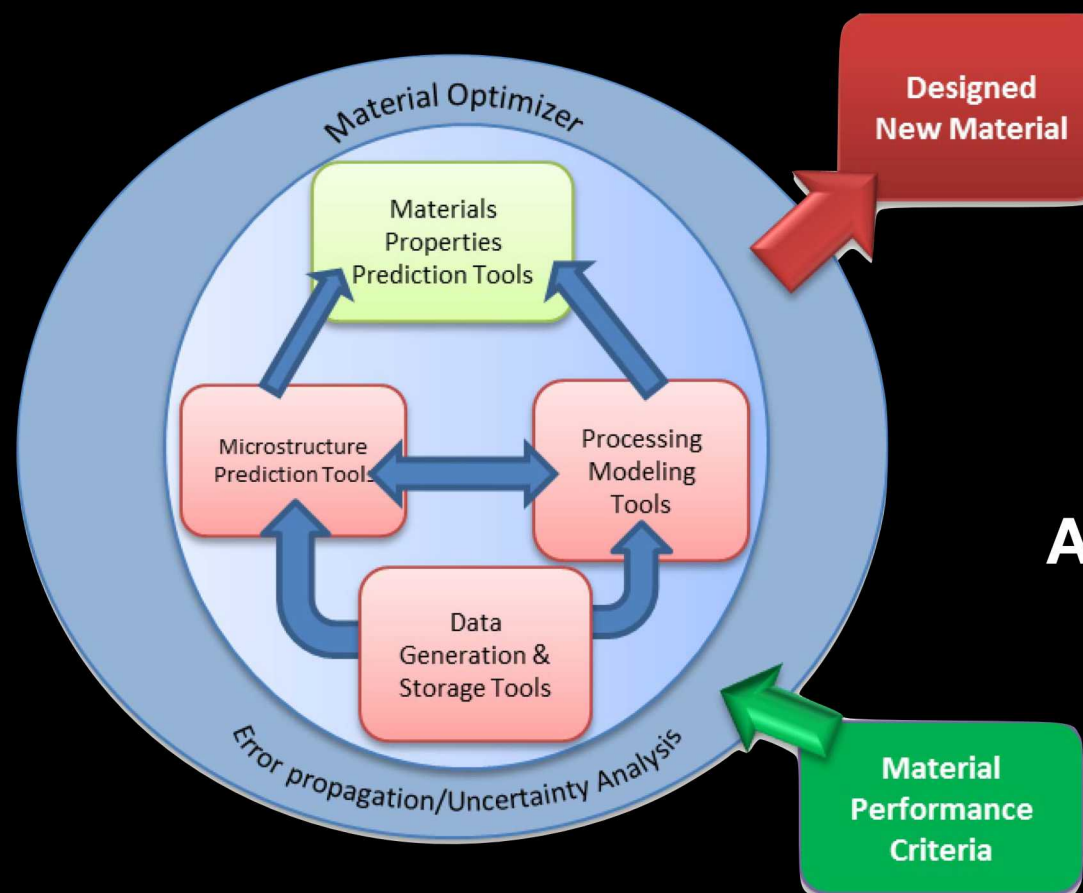
CMEDE

CENTER FOR
MATERIALS IN EXTREME
DYNAMIC ENVIRONMENTS

<http://chimad.northwestern.edu/>



<http://www.cngmd-efrc.org>



<http://cmime.lanl.gov>



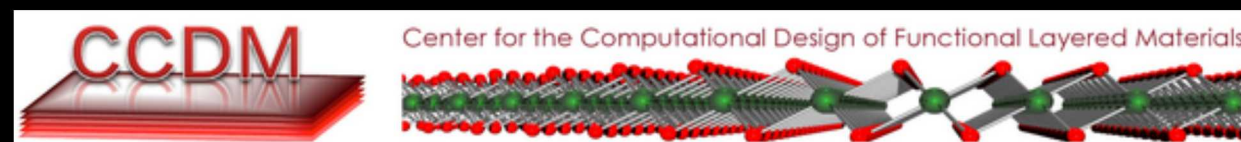
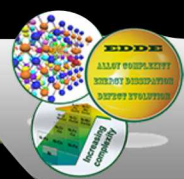
And many others.....

<https://www.mgi.gov>

<http://efrc.cst.temple.edu>

<https://edde.ornl.gov>

Energy Dissipation to Defect Evolution (EDDE)
an Office of Basic Energy Sciences Energy Frontier Research Center (EFRC)



AT THE INTERSECTION OF COMPUT'L MAT. SCI, DATA ANALYTICS AND EXPERIMENTAL CHARACTERIZATION

